



BETTER HEAT

A CARBON-FREE COMMUNITY HEAT SOLUTION





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BETTER HEAT

The Accelerate Group, Environmental Defense Fund, and Citizens Utility Board are pleased to respond to the City of Chicago's Electricity Franchise RFI to present the BETTER HEAT model for transitioning the city's residential and small commercial building sector to a carbon-free, community-driven heat utility. The BETTER HEAT model will position the City of Chicago as a global leader in fighting climate change. While the Electricity Franchise RFI is in part about the relationship between the City and electricity distribution utilities, it also provides the opportunity for the Chicago community to think and plan more broadly about how the City is best empowering its residents to meet the global and local challenges of climate change and the Peoples Gas affordability crisis. We respectfully submit for your consideration a plan for BETTER HEAT.

THE ACCELERATE GROUP | LLC





BACKGROUND

The Peoples Gas Affordability Crisis

A city and its residents trapped by a gas utility

In September 2020, 30 percent of Peoples Gas' customers in Chicago received disconnection warnings, meaning that nearly 1 in 3 customers in Chicago can't afford to pay their monthly gas bill – in the summertime. The city is facing an impending heating and utility affordability crisis as billions of dollars in cost overruns in the gas utility's pipeline replacement costs have been past on to its captive customers, costing the average Chicago household more than \$130 a year already, with massive increases still to come.

Once pitched as a “modern” approach to heating buildings, gas heat has since become an economic, safety, and climate albatross for much of the country. Frozen gas pipelines in February 2021 in Texas and the plains drove energy prices to record levels and left homes without heat for days in the midst of record cold. Pipeline leaks, which have necessitated the multi-billion pipeline replacement program, created health and safety hazards in our communities, and are one of the largest contributors to climate change.

Methane is dead, and the City must grapple with how to replace it. Continued investment in the natural gas system is putting a very expensive band-aid on a gaping wound. Every day that passes, the crisis worsens.

Without a comprehensive strategy, the crisis will only worsen. As gas heating bills rise even higher, customers with means will exit the gas system, leaving fewer and fewer customers to pay the ever-increasing share of costs.

- 30% of Chicagoans can't afford to pay their September gas bill. This will only get worse.
- Fixed charges (the amount a customer has to pay before using any gas) for Peoples Gas now exceed \$40 and are projected to increase to at least \$65 in the coming years.
- The average amount “in arrears,” that customers have not paid, nearly doubled during the pandemic.



BACKGROUND

Its time for **BETTER HEAT** in Chicago

Leveraging the heat of the earth is the path to lower costs, cleaner air

Moving beyond fossil fuels

Its time for a BETTER approach. Its time to allow Chicago residents the option of pursuing an option for home heating that is cleaner, cheaper, more reliable, and safer. It's time for a new community-focused model that doesn't rely on burning fossil fuels, and instead leverages the heat of the earth to create a carbon-free, shared heating utility that allows the city's low-income residents to escape the crushing costs and risks of the gas infrastructure.

Geothermal energy—which leverages the Earth's heat to heat and cool buildings—is currently the most efficient technology for keeping homes and businesses warm. Geothermal systems create heat 5 times more efficiently than a gas furnace, and create more consistent temperatures.

To date, this has not been a viable option for dense urban environments, as geothermal systems require pipe to be laid horizontally in a backyard or vertically in deep wells. There is simply not the space for that on private property in Chicago's neighborhoods.

This is where the BETTER HEAT model and the City of Chicago hold the solution. Just as local government has granted a polluting, expensive heating company a charter to distribute heat beneath our streets, the City should create the same opportunity for a new, carbon-free heating utility. It would use that same ground under our streets and alleys to deliver environmentally-sustainable heat more cost-effectively to residents.

A modular, geothermal backbone underneath the city could provide consumers an energy alternative that better meets their needs, and positions Chicago as a national leader in supporting communities being bankrupted by their gas utility. Unlike gas distribution, this backbone could be built a block or blocks at a time as demand grows—because it doesn't need to be connected to a centralized interstate gas pipeline.



BETTER HEAT

A CARBON-FREE COMMUNITY HEAT SOLUTION



Toward a Carbon-Free Chicago

Chicago action on climate requires an alternative to gas heat

The City of Chicago has adopted an appropriately aggressive GHG reduction agenda to help mitigate the global impact of climate change. In 2008, the City unveiled the Chicago Climate Action Plan (“CCAP”). CCAP outlined the City’s plans to reduce Chicago’s GHG emissions 80% below 1990 levels by the year 2050, with an interim goal for the year 2020 of 25% below 1990 levels. In June 2017, the City committed to the goal of reducing citywide greenhouse gas emissions to levels equivalent to a 26%-28% reduction from 2005 levels by the year 2025 – the amount required by the United States’ commitment to the Paris Climate Accord.

Chicago also recently established goals of powering all public buildings with 100% renewable energy by 2025 and achieving 100% clean energy citywide by 2035. The City of Chicago 2017 Community-scale Greenhouse Gas Emissions Inventory results showed encouraging news. There is still significant work to be done, but overall emissions are down since the 2005 base year and the City is now over half of the way to reaching its Paris Agreement 2025 target.

But despite this progress, **emissions caused by residential natural gas consumption increased during the time period covered by the Inventory**, one of only two categories that saw increases (landfill solid waste was the other). Indeed, energy usage in residential buildings now comprises the largest category of City GHG emissions, with fossil fuel heat the major contributing factor.

RFI: “City will need utility partners to support efforts to reach its bold climate and energy goals,”:

1. Power city-owned buildings by renewable energy by 2025
2. Supply renewable energy for all buildings by 2035
3. Convert to an all-electric public bus fleet by 2040
4. **Develop a citywide building decarbonization strategy**



BETTER HEAT

The BETTER HEAT model

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Geothermal energy—which leverages the Earth's heat to heat and cool buildings—is currently the most efficient technology for keeping homes and businesses warm.

Geothermal systems create heat 5 times more efficiently than a gas furnace, and create more consistent and comfortable temperatures. How does it work?

- Geothermal systems run liquids through pipes underground to capture the heat (or cold) of the earth, and pipe that energy to an electric heat pump. The temperature underground stays consistent year-round, as anyone with a basement in a temperate climate can attest. In the Better Heat model, the underground pipes are shared among a community, rather than being installed in only one homeowners' yard.
- The electric heat pumps, which extract the heat from the pipes, operate like an air conditioner in reverse. Heat pumps are common across warmer areas of the country, where they operate in just the open air. While heat pumps typically operate less efficiently when operating in cold air, they operate near their highest efficiency when working with the piped liquid at the temperature of the earth.
- Those heat pumps are then connected to a home's existing heating appliances, such as central air systems, radiators, or other equipment, that circulates the heat through a home.

BETTER HEAT Components

1 – Shared Underground Heating Loop

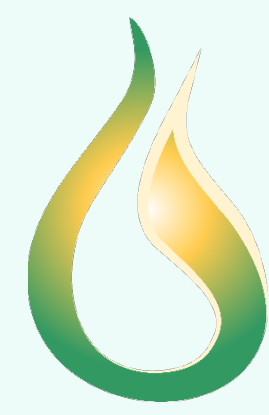
The BETTER HEAT model relies on the creation of shared, underground pipe loops that pull in the consistent temperature of the earth at a community scale. BETTER HEAT community loops are completely modular, allowing households to “opt-in” to a neighborhood loop when they are ready to switch to carbon-free heat.

2 – Electric Heat Pumps

Electric heat pumps are common in warmer climates because the air temperature doesn't get as cold. Using the liquid running through the pipes in the shared underground heating loop, the heat pump is able to leverage the earth's warmer temperature, instead of cold outside air, and can run highly efficient, even in cold weather.

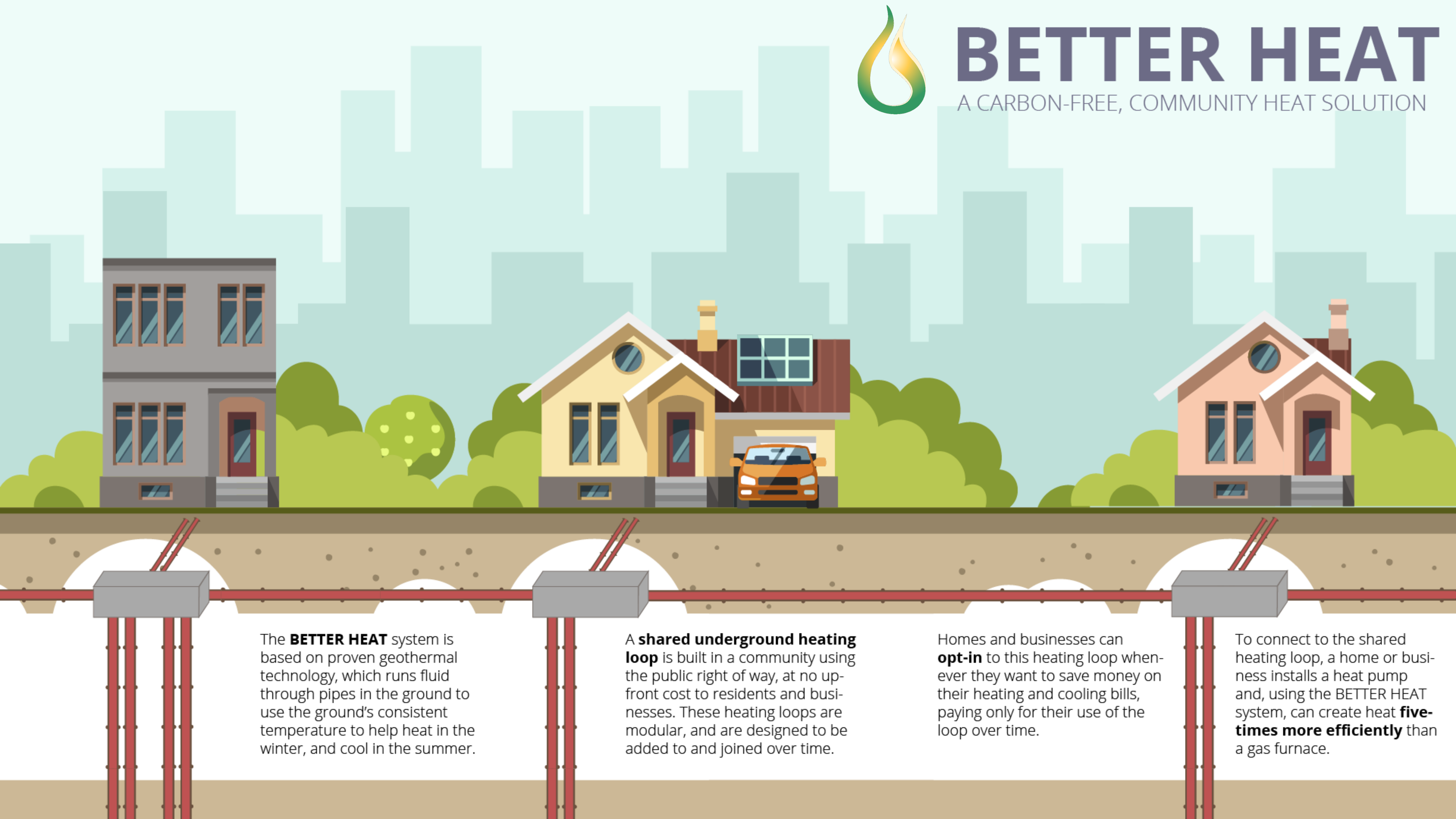
3 – Existing Home Appliances

Electric heat pumps can often connect to a home's existing appliances to distribute heat (and cool) around a home.



BETTER HEAT

A CARBON-FREE, COMMUNITY HEAT SOLUTION



The **BETTER HEAT** system is based on proven geothermal technology, which runs fluid through pipes in the ground to use the ground's consistent temperature to help heat in the winter, and cool in the summer.

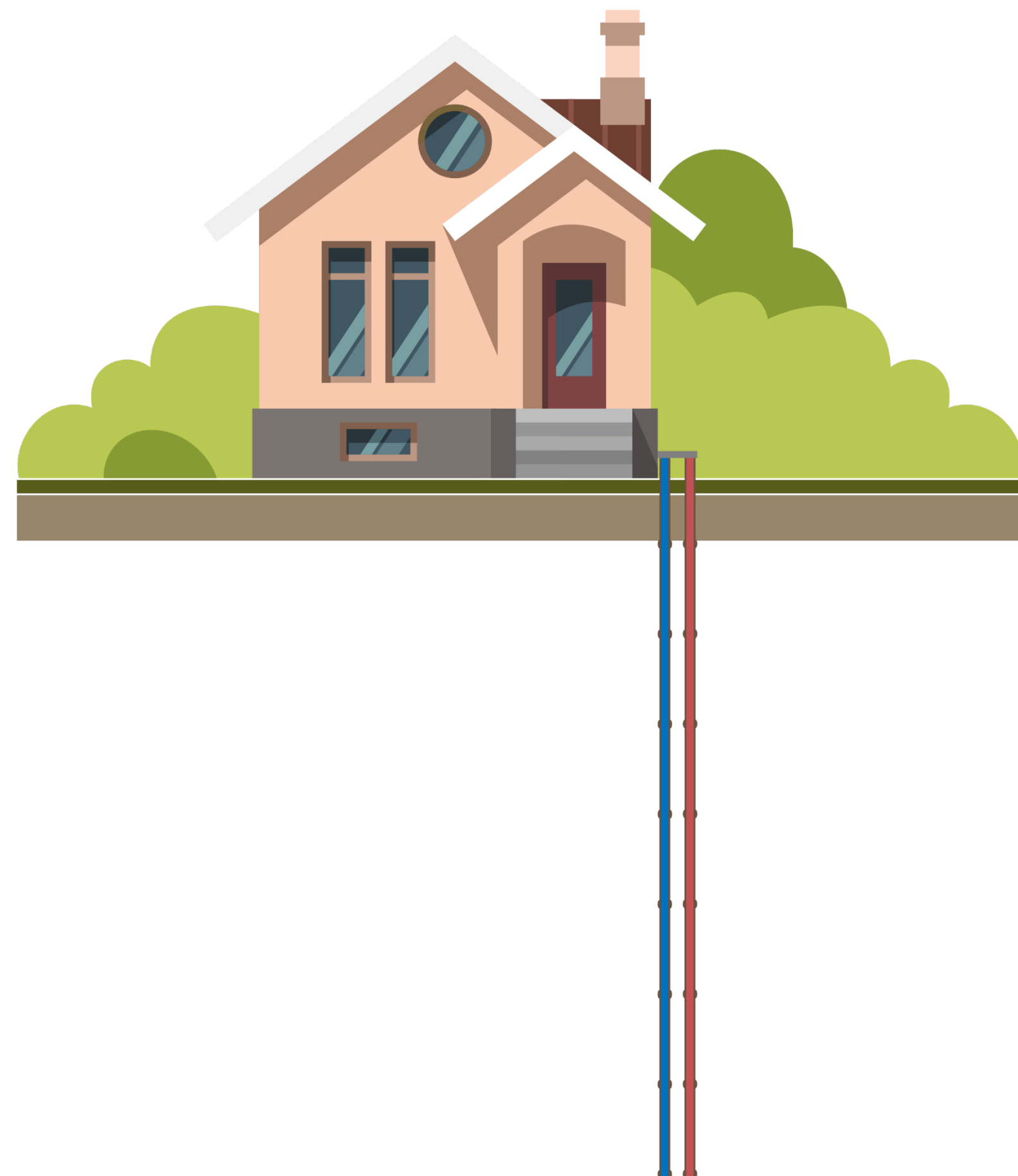
A **shared underground heating loop** is built in a community using the public right of way, at no upfront cost to residents and businesses. These heating loops are modular, and are designed to be added to and joined over time.

Homes and businesses can **opt-in** to this heating loop whenever they want to save money on their heating and cooling bills, paying only for their use of the loop over time.

To connect to the shared heating loop, a home or business installs a heat pump and, using the BETTER HEAT system, can create heat **five-times more efficiently** than a gas furnace.



How does Geothermal Work?



Geothermal heat pumps, which are also referred to as “ground source heat pumps,” are a highly efficient renewable energy technology. The technology relies on the fact that the earth (below the surface) remains at a constant temperature throughout the year. In Chicago, at about 6 feet below the surface, the temperature is consistently around 51 degrees Fahrenheit.

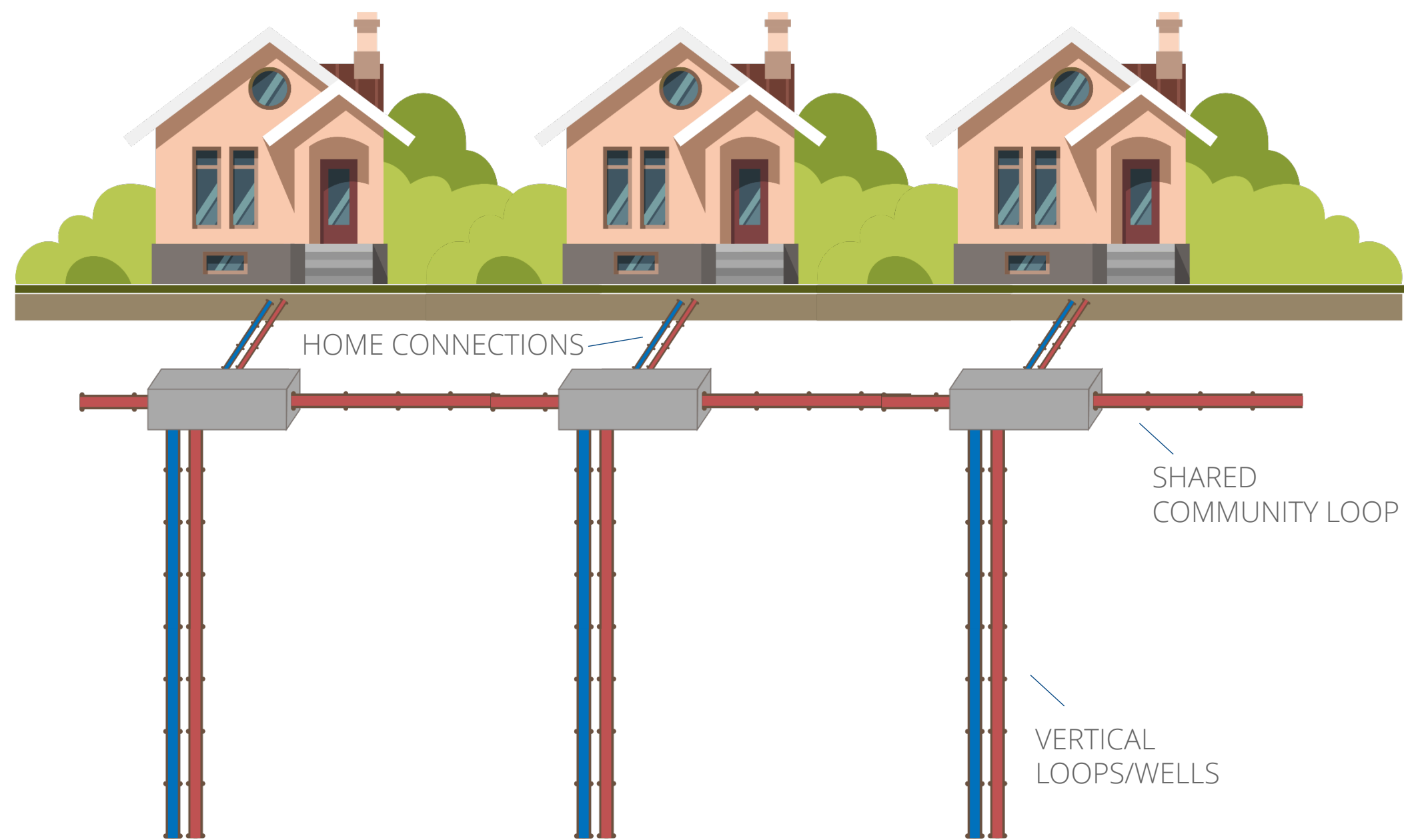
Geothermal systems transfer the earth’s heat into a building during the winter to provide warmth, and take advantage of the cool earth temperatures to cool buildings in the summer as well. As described, geothermal systems have three main components: an underground loop of pipes, a heat pump to extract heat from the pipes in a home, and appliances to distribute heat throughout a home. Geothermal heat pumps can also be used to fuel hot water systems, and other heating needs.

Chicago residents are limited by space. While in many parts of the country, households are installing geothermal systems in their yards or on their land, but in a dense urban environment like Chicago and its near-in suburbs, there typically are not yards large enough to install geothermal loop systems.

That’s why the BETTER HEAT model uses the space the city does have – under streets, in alleys, and on common land – and gaining efficiencies through a shared system design.



A Community-Based Approach



Shared Community Loop. The BETTER HEAT model does not require individual property owners to develop their own horizontal or vertical pipe systems on limited space. Instead, BETTER HEAT creates community-sized loops that allow households to share the earth’s heating and cooling potential across the public right of way. The BETTER HEAT design creates a combination of horizontal and vertical loops that are sized to meet the heating needs of the households in the community.

Vertical Loops/ Wells. Along the Shared Community Loop are spaced vertical loops that can be drilled 400’ deep and connected to the community loop to enhance the heating and cooling potential of the Community Loop, as new buildings join the loops or as energy needs of the community change.

Modular/Opt-in Approach. The BETTER HEAT model allows individual buildings to join when they are ready, and does not require an entire community to transition at once. The progress toward building decarbonization will likely take decades, and buildings may not all be ready to switch their equipment and appliances at the same time. As more buildings join the Shared Community Loop, more vertical loops/wells can be added to meet the need.

Connections. When households are ready to connect their building to the Shared Community Loop, they will get a pair of pipes (input and output) run from the Loop to their new heat pump. These pipes will be connected to the Shared Community Loop in a container located in a vault underground in the public right of way. This container contains equipment to direct, protect, and meter the energy in the pipes used by the home.



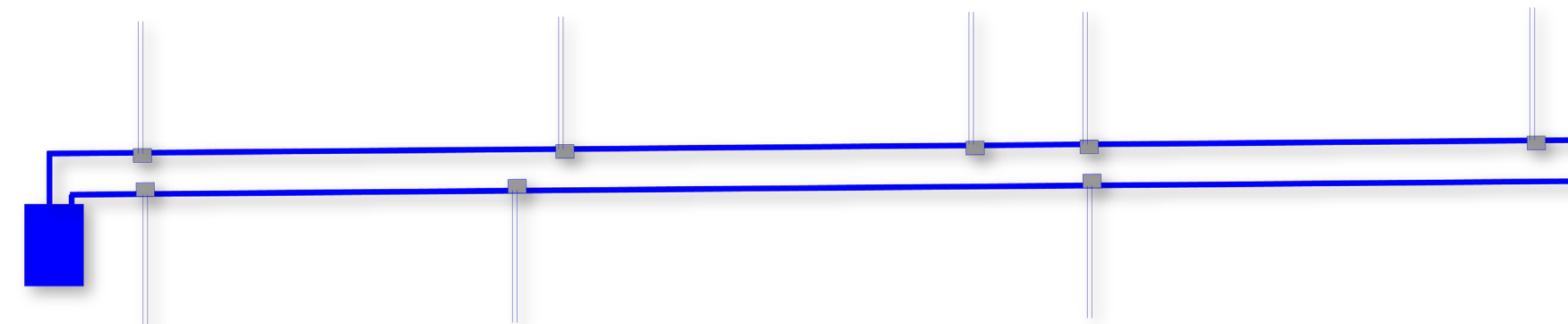
Communities can 'Opt-in'

Initial Loop. Under the BETTER HEAT model, the entire community does not have to switch over their heating and cooling systems at the same time. Residents can update their systems at their own pace, when their gas heating appliances or air conditioning systems are at the end of their lives, or when they have the funding or financing to do so. An initial Shared Community Loop can be developed with as little as 4-8 households on a block. Since BETTER HEAT is designed to operate as a public utility, the costs are recovered over decades.

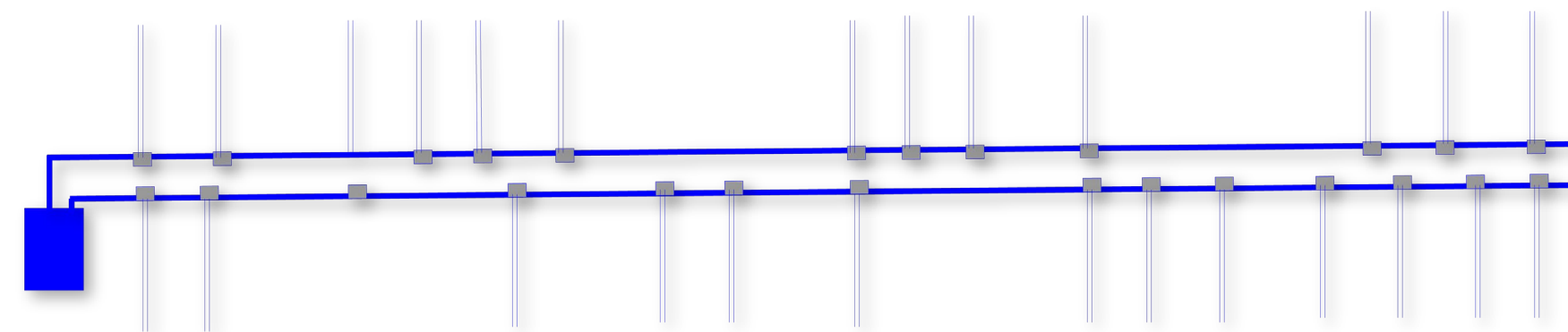
Opt-in and Growth. As more households seek to save money and reduce pollution and the harmful public health impacts of gas heat, the additional connections of homes to the loop would be simple and modular. A new connection container would be installed underground outside the home to connect the house to the main loop and house any new vertical wells.

Most Efficient. When every home in a neighborhood connects to the Shared Community Loop, the system will be at its highest operational efficiency, able to balance loads more easily across homes based on needs. The more homes covering the costs of the system, the cheaper the overall program becomes.

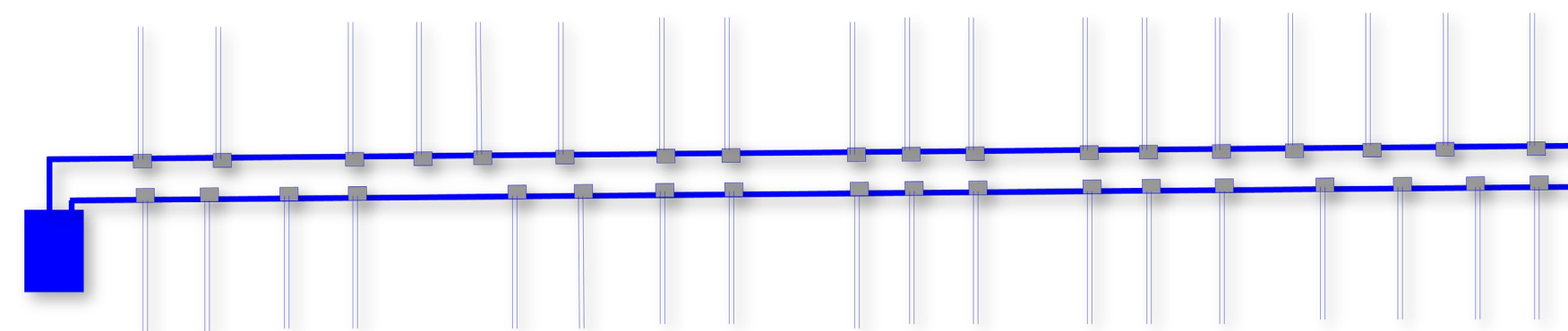
INITIAL LOOP



OPT-IN AND GROWTH



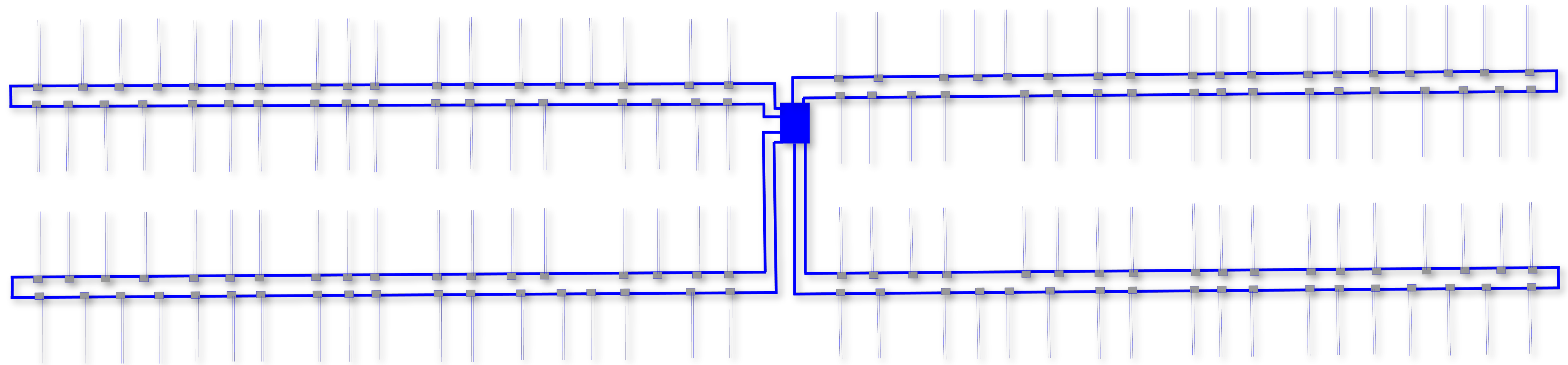
EVERY HOME CONNECTED





Community Loops can grow and connect

Combining Loops. As adoption of the BETTER HEAT systems grow in communities, additional efficiency, lower costs and system balancing can be achieved by connecting adjacent shared community loops to each other,





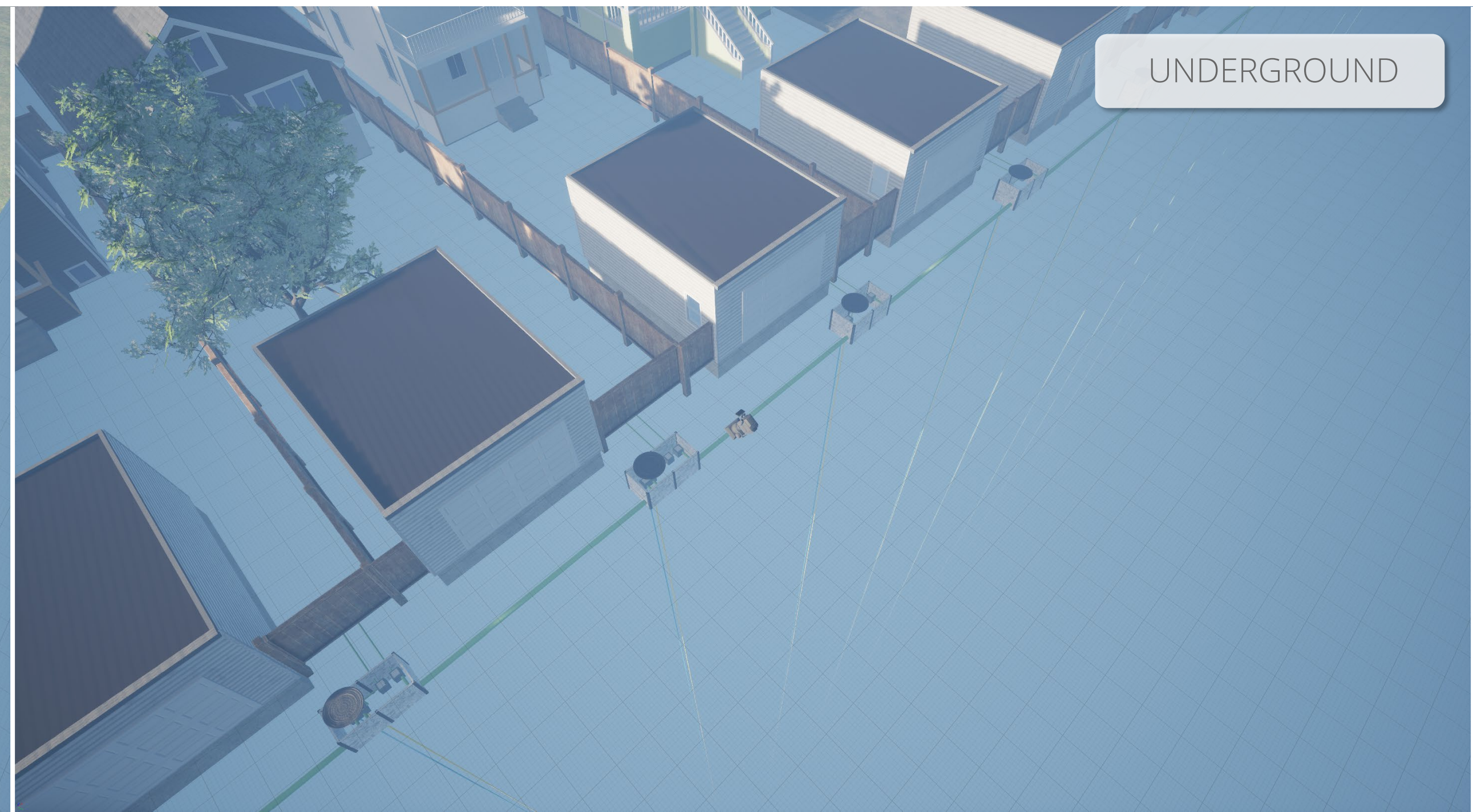
BETTER HEAT

A Carbon-Free Utility

Building decarbonization as a public good

The BETTER HEAT model expects that the shared geothermal systems operate as a public utility, subject to regulation by the state public utility commission to ensure its rates are just and reasonable, and under oversight of the city government. Establishing a carbon-free public utility puts the responsibility on the community at large for the decarbonization of the building sector, rather than putting the burden completely on individual property owners to finance and build their own systems.

A public carbon-free utility would enable the Shared Community Loops, Vertical Wells, Connection Containers, and Home Connections to be a public good, with costs recovered over a longer period of time (30-40 years) compared to private investment (5-7 years). This lowers the cost of heat, and ensures that early costs are smoother out with later revenue as adoption grows over the next several decades. The City should also think creatively about ensuring the benefits of the utility model are shared with City residents, including retaining a financial stake in the utility and building wealth and equity in low-income communities.





ROLES

A Carbon-Free Utility

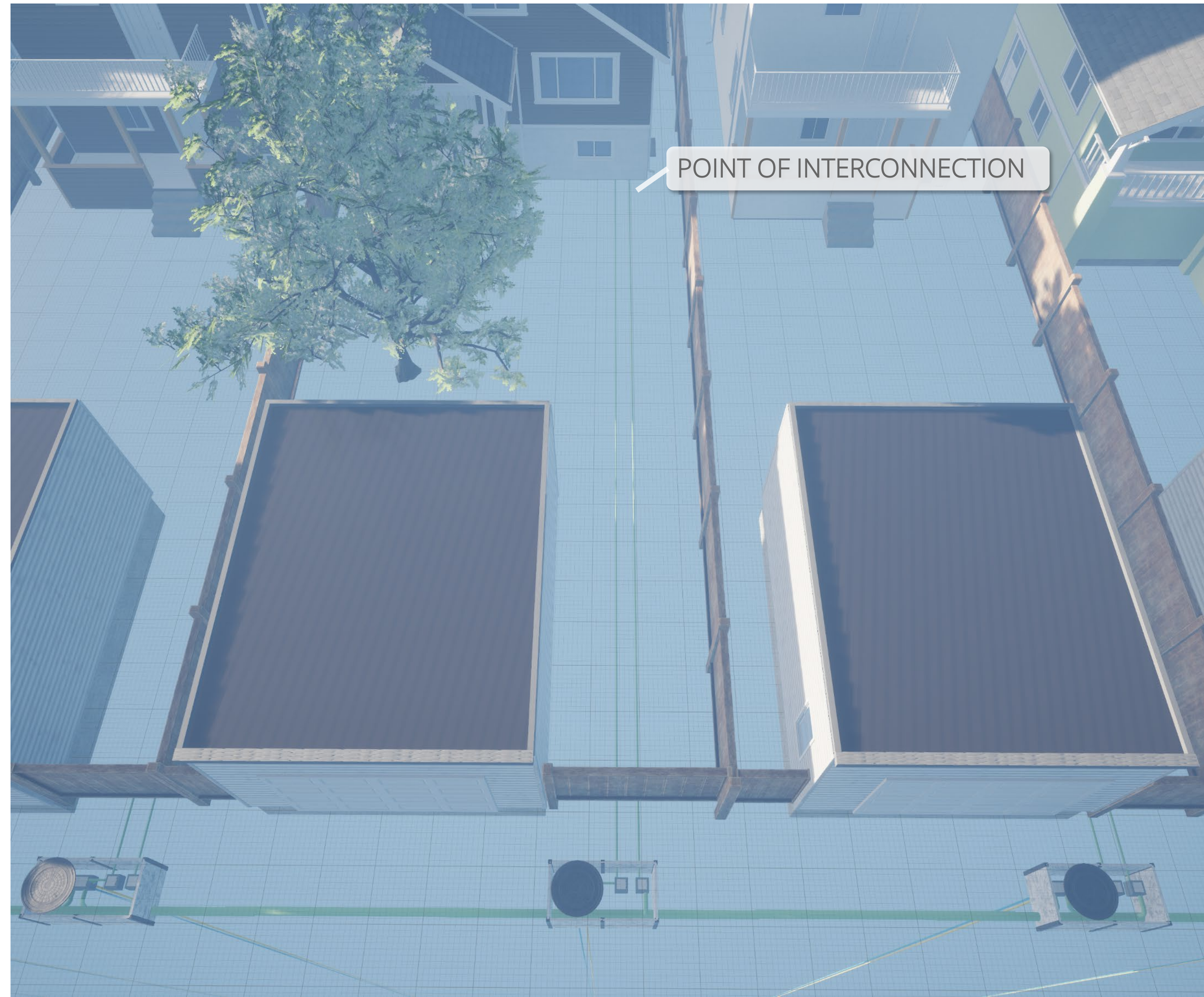
Lower consumer costs for installation as much as possible.

POINT OF INTERCONNECTION

Every asset on the public utility side of the point of interconnection would be part of a regulated business model. This allows for the recovery of just and reasonable rates over a long period of time.

The point of interconnection would be established as an access point, consisting of an intake pipe and an output pipe, a pipe connection, and a shut-off valve, located in close proximity to a customer's heat pump on the customer's property.

However, there would still be a significant need for private investment and business development on the customer side of the point of interconnection, through carbon-free retrofits.





Green Infrastructure

NEW BUSINESS DEVELOPMENT

As part of the conversion of each home on a Community Shared Loop, there would be significant opportunity for new businesses to start and grow in order to electrify homes. New heat pumps need to be distributed and installed, existing furnace and boiler systems need to be upgraded, and new insulation and thermostats will need to be installed to make buildings more efficient.

EQUITABLE BUSINESS OPPORTUNITY

As a community-based concept, the BETTER HEAT model expects that the development of carbon-free buildings in Chicago will create jobs, wealth, and opportunity for the communities most impacted by the gas heat crisis. This means that workers installing the BETTER HEAT systems should look like the communities in which these projects are being developed, and the companies selling, installing, and solving home energy upgrades should be born out of the communities and neighborhoods that will be piloting and growing this work.

WHOLE SYSTEMS CHANGE

BETTER HEAT is an opportunity to use a whole-system approach to the energy system of the future using green infrastructure. Designing community projects holistically can produce a host of other benefits that benefit health and increase wealth in priority communities. This is an opportunity to address other infrastructure improvements that have been delayed, and this is an opportunity to do that work better and more efficiently.

NEW BUSINESS OPPORTUNITIES IN HOME RETROFITS

HEAT PUMP DISTRIBUTION

SYSTEM DESIGN AND SALES

HEAT PUMP INSTALLATION

HVAC SYSTEM UPGRADES

ELECTRICAL ENERGY EFFICIENCY CONTRACTORS

BUILDING ENVELOPE ENERGY EFFICIENCY CONTRACTORS

PROJECT FINANCING AND LENDING



City of Chicago Next Steps

To move the BETTER HEAT model forward, the City should immediately initiate a stakeholder workshop process to begin working on next steps. The most effective path forward would be for the City to take a leadership role in enabling community pilots, and then using lessons learned from the pilots to determine and develop the best approach to scale carbon-free heat city-wide.

1

COMMUNITY PILOTS

The city should identify and seek funding for three community pilots to test the technical, economic, and real-world feasibility of the BETTER HEAT model, with a focus on communities most able to benefit from a shared community loop approach.

2

AUTHORIZATION

To enable Community Pilots, the City should create interim Charters for the development of the pilots, granting necessary authorizations for a BETTER HEAT model to connect homes through the public right of way.

3

CITY-WIDE SCALABILITY PLAN

While the Community Pilots are running, the city should develop a city-wide Scalability Plan to determine the best path forward to transition communities to carbon-free heat.



Community Pilots

The city should identify and seek funding for three community pilots for BETTER HEAT to test the technical, economic, and real-world feasibility of the BETTER HEAT model, with a focus on communities most able to benefit from a shared community loop approach.

COMMUNITY PILOT PARAMETERS

PLANNING

PLANNING

The City should immediately convene a working group to develop a plan for community pilots, including representatives and leaders from communities under consideration. The working group should work to develop a life cycle affordability analysis of solutions, and require that any approach be designed to lower bills for residents.

TECHNICAL FEASIBILITY

TECHNICAL FEASIBILITY

Prior to the deployment in pilot communities, a BETTER HEAT scale model should be developed in a publicly-visible location, allowing for residents, officials, contractors, and others to discover how geothermal community loops could function, and the typical installation of electric appliances in a home.

COMMUNITY IDENTIFICATION AND ENGAGEMENT

COMMUNITY IDENTIFICATION AND ENGAGEMENT

The working group should engage in a public listening process to identify community needs around the transition to carbon-free heat, and allow for communities to raise their hands to host real world BETTER HEAT community pilots. Communities should further have a say in the selection criteria and selection for any entities working on pilots.

ECONOMIC FEASIBILITY

REAL-WORLD KEY LEARNINGS

METRICS

ECONOMIC FEASIBILITY

A key goal of the BETTER HEAT community pilots shall be to determine the real world costs of community loop design and construction, home retrofits and installations, community engagement and education, and other ancillary costs. Once completed, the City should conduct a study on the economic feasibility of a BETTER HEAT model by customer types.

REAL-WORLD KEY LEARNINGS

The working group should convene regularly with residents of pilot communities to gain input and feedback from lived experiences, identifying strengths and weaknesses of the BETTER HEAT approach, and workshopping opportunities for improvement and key considerations for deploying at scale.

METRICS

The City should establish metrics to measure the execution of pilots, as well as results. Metrics should include, at a minimum, equity performance metrics, community decision-making, and community benefits.



Authorization

To enable Community Pilots, the City should create interim Charters for the development of the pilots, granting necessary authorizations for a BETTER HEAT model to connect homes through the public right of way.

Chicago has authority to move forward on Pilots

Chicago has the needed authority to allow for the use of the right of way for BETTER HEAT and other innovative pilots. Chapter 10-29 of the Municipal Code allows for the necessary infrastructure installation so long as a permit is granted. The City's agreement with the developer(s) can be structured to waive the permitting fees, per 10-29-040(b), if approved by City Council and Corporation Council; that structure should be embedded in the franchise or similar agreement enabling BETTER HEAT or other community pilots.

Alternatively, the City could amend 10-20-050, Effect of chapter on franchises and permit requirements, to reflect that new franchise agreements entered into for the purpose of providing heating, hot water, power, etc. may include an agreement between the City and the franchisee or grantee as to appropriate fees, and in that case, such agreement shall control.

City should grant charters for pilots

The City can create charters or interim charters for the development of select pilots, granting necessary authorizations to connect homes through the public right of way. ComEd's franchise agreement grants it a non-exclusive right to work in or occupy the public way, and is explicit that the City reserves the right to grant similar use to others. The City can execute similar non-exclusive grants with any other licensees, franchisees or permittees.

Such charter or charter should provide the guidelines around which pilots are governed, projects are executed, residents are provided benefit, communities are engaged and have leadership roles, performance is tracked, and residents have recourse in the event of failure.



City-wide Scalability Plan

While the Community Pilots are running, the city should develop a city-wide Scalability Plan to determine the best path forward to transition communities to carbon-free heat.

SCALABILITY PLAN COMPONENTS

PRIORITIZATION

PRIORITIZATION

As part of the scalability plan, the City shall examine whether to prioritize communities for a transition to a carbon-free heat utility, based on the economic feasibility analysis, in order to address the worst impacts of ballooning Peoples Gas bills.

NEEDED REGULATIONS

The Scalability Plan process shall outline and develop any regulations needing to be established upon a BETTER HEAT model, including charters, oversight, ownership, ethics, and equity standards.

GOVERNANCE

GOVERNANCE

The Scalability Plan shall work to develop the most appropriate ownership and operational models for establishing community loops and supporting home retrofits.

CITY ACTION PLAN

The Scalability Plan shall finally outline the next steps for the transition of communities throughout the city to a BETTER HEAT model, as appropriate, including the required market and workforce development needs, the consumer education needs, and coordination needs across city departments, as well as state and other governments.

IDENTIFICATION OF SUPPORTIVE POLICIES

IDENTIFICATION OF SUPPORTIVE POLICIES

The Scalability Plan shall identify areas within existing city policy, or in state regulation, that can or should be adjusted in order to better support building decarbonization and carbon-free utility strategies.

NEEDED REGULATIONS

CITY ACTION PLAN



NEXT STEPS

About us

THE ACCELERATE GROUP | LLC

The Accelerate Group is a strategic consulting and innovation firm focused on accelerating large civic change initiatives. We help governments, companies, and not-for-profits working to advance clean tech, smart cities, innovation, good government and economic development projects at a local and global scale. The Accelerate Group has a proven history of launching groundbreaking projects that advance innovation in energy, including the development of community microgrids, deployment of smart building technology, and innovative energy efficiency programs.



CUB is the most successful state-based consumer advocacy organization in the country. Our primary policy objective is to maximize investment in energy efficiency and other distributed energy resources, as these are our cheapest and cleanest resources. In pursuit of this goal we employ a multi-faced strategy of grassroots organizing that engages consumers on the local level through events and online advocacy; working to develop new markets and business models for distributed energy resources and the reduction of GHG emissions; and policy leadership through collaboration, partnership, and strategic advocacy before the ICC and Illinois Power Agency ("IPA"), the state legislature, Regional Transmission Organizations ("RTO"), and FERC. We have a long track record of success on supporting and implementing progressive energy policies, and are national leaders on energy efficiency, distributed energy resource, electric vehicle, smart grid, and utility business model reform issues. Since our founding in 1984, we have saved Illinois consumers over \$20 billion on their utility bills while at the same time significantly lowering overall pollutants from electric generation, and we have played a large role in every major policy change/process in the state.



EDF is a national environmental nonprofit organization whose mission is to preserve the natural systems on which all life depends. Guided by science and economics, EDF finds practical and lasting solutions to the most serious environmental problems. EDF has a strong interest in minimizing the public utility industry's significant contribution to climate change and other environmental problems. EDF has deep expertise in public utility regulation, analysis of public utility investments, and adoption of innovative clean energy alternatives. Through collaborations with diverse stakeholders, rigorous technical analysis, and litigation, EDF ensures that public utilities provide safe, equitable, clean and affordable power. EDF regularly engages directly with utilities, at the Illinois Commerce Commission and other state and federal regulators, and legislatures on issues concerning utility operations and policies to accelerate a clean, distributed grid that serves increasingly electrified transportation and building sectors. Additionally, EDF is a co-founder of the Pecan Street smart neighborhood in Austin, Texas, with over 1,000 participants, and engaged with ComEd and at the Illinois Commerce Commission on the design of the utility's Bronzeville neighborhood microgrid.

Thank you!

